Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

M

UNITED STATES DEPARTMENT OF AGRICULTURE
MISCELLANEOUS PUBLICATION NO. 107

Washington, D. C. March, 1931

AN EXPLANATION OF AMERICAN LUMBER STANDARDS

By C. V. Sweet,[1] *Principal Engineer, in Charge Section of Industrial Investigations, Forest Products Laboratory,[2] Branch of Research, Forest Service*

CONTENTS

Page
American lumber standards in relation to association rules and to purchases by the ultimate user 2
Résumé of provisions of American lumber standards 4
  Grade standards 4
  Size standards 5
  Measurement, description, tallying, and marking standards 5
  Inspection service and maintenance of standards 6
  Nomenclature of commercial woods 6
Summary and conclusions 6
Appendix A 7
  Lumber associations issuing grading rules for important commercial species and maintaining inspection departments 7
Appendix B 7
  Select grade qualities under basic grade classification for softwood yard lumber 8
  Typical defects of determining importance in select grades 8
  Common grade qualities under basic grade classification for softwood yard lumber 8
  Typical defects of determining importance in common grades 9

American lumber standards, published as Simplified Practice Recommendation R 16–29, fourth edition, by the United States Department of Commerce, have been created for the purpose of eliminating unnecessary differences in the grading rules of the various softwood lumber manufacturers' associations of the United States and to embody the efforts to date of the several organized branches of the lumber trade to work out together such improvements in lumber manufacturing and merchandizing practice as will result in the maximum satisfaction in the use of lumber consistent with the price levels and the competitive conditions that characterize the lumber trade.

The provisions of American lumber standards serve as a guide to each regional lumber manufacturers' association in preparing or revising its grading rules. When an association is prepared officially to adopt and publish association rules based on those standards the rules must comply with the requirements set forth. A permanent organization, the central committee on lumber standards, made up of representatives of lumber producers, distributors, and consumers, acts as a steering committee in considering necessary additions and revisions to American lumber standards and passes judgment as to when the association rules comply with the standards. Thus they are intended more as a framework for association rules than as grading rules themselves. To buy according to those standards a person must buy according to association rules that are in conformance with them because in general the standards themselves are not complete in the details which are necessary to actual purchase specifications.

---

[1] The information relative to grade and defect characteristics given in Appendix B is based upon extensive investigations by E. M. Davis, Forest Products Laboratory, for which the author makes grateful acknowledgment.

[2] Maintained by the U. S. Department of Agriculture at Madison, Wis., in cooperation with the University of Wisconsin.

The United States Department of Commerce, through the Division of Simplified Practice, organized the means by which representatives of the various interested groups could come together to formulate the provisions of lumber standardization. It approves the membership of the central committee on lumber standards, who are selected by the industry, and sponsors the functioning of consulting committees and the necessary standardization procedure. The United States Department of Agriculture through special studies made by its Forest Products Laboratory contributed part of the information that was needed by the trade in the formulation of the standards. However, to the lumber trade itself, and organizations of engineers, architects, contractors, and railroads, was left the actual decision as to what the standards should be.

It is believed that very substantial benefits have accrued, and will continue to accrue to the general buying public and to the lumber industry as the standards become more commonly accepted. To insure that the permanent benefits from American lumber standards are not delayed because of any confusion and misunderstanding concerning them on the part of the lumber-buying public this description is given of what the standards include and how they apply in practice.

AMERICAN LUMBER STANDARDS IN RELATION TO ASSOCIATION RULES AND TO PURCHASES BY THE ULTIMATE USER

The " association rules " are the usual basis of agreement between the sawmill sales organization and the retail lumber dealer with whom the lumber-buying public come in contact. These rules are promulgated and administered by regional associations of lumber manufacturers to cover the kinds of lumber produced by their members. Each association has its own grading specifications and inspection department except in a few cases where these functions are handled jointly by two associations. Practice varies among associations in respect to both the rules and their administration according to the kinds of lumber produced and the necessities of the operating conditions of the region. Association rules in most cases have been in use, subject to periodic revision and development, over a long period of years. American lumber standards do not take the place of these regional rules, nor did they occasion radical changes in their scope or contents, but they do provide the basis for greater uniformity among them.

The farmer, builder, or contractor in buying lumber relies to a large extent on his local dealer for the kind, grade, and utility value of the lumber he gets. He usually buys with some particular use in mind. He knows very little about association grading rules, and in any event rules which must be drawn up to comply with general requirements of both production and use can hardly be directly applicable in his particular case. The confidence that he can place, therefore, in what the dealer can and will supply is a factor of major importance. Nothing that has been devised thus far can take the place of the confidence and service which the local dealer is in a position to give. On the other hand, nothing guarantees that this protection will be forthcoming. The fact that a given lot of lumber is in accordance with provisions of American lumber standards means that it is described in grading rules and invoices in approved terms; but it does not eliminate the necessity for exercising the ordinary precautions relative to differences in species, shipments of the same species from different sources, protection received in shipment and storage, and the like.

American lumber standards are brought into direct application by the retail dealer in making his purchases from the mill or wholesaler through the use of association rules. However, the standards are not so directly applicable by the ultimate user when he buys from the retail yard. This is the case because the agencies administering the association rules are the manufacturers' associations, and they naturally assume no specific responsibility beyond the party they sell to: that is, the original buyer—retailer or wholesaler. Moreover, lumber is of such a nature that if it is not properly protected after shipment from the mill, it may change in size, grade, and condition to a point where it is difficult to determine whether or not it conforms to rules which applied to the lumber when shipped. For this reason, what the lumber-buying public actually gets under American lumber standards varies with several factors, including the kind of lumber, the mill that manufactures it, and the dealer that supplies it.

The question naturally arises as to how the consumer can distinguish between standard and nonstandard lumber except as it is described one way or the other by the retail dealer who handles it. The use of a grade mark supplemented by a nationally uniform insignia to identify standard lumber is approved in principle by American lumber standards, although not required. To give expression to this principle many manufacturers supply lumber that is grade marked and also marked with the symbol of the mill and the association under whose rules the lumber is sold. In addition many lumbermen have organized themselves and sponsor the use of a special national trade-mark, called the "tree mark," which is their pledge that lumber so marked is in accord with American lumber standards and carries their financial guarantee to the first consignee unloading the shipment that it is exactly as marked. Others may join this group and make use of the special symbol and trade-mark if they are willing to comply with certain conditions as to responsibility and licensing. However, the use of a nationally uniform insignia such as that provided for in American lumber standards, is not in effect, and presumably much lumber conforming to the standards is not marked either by association trade-marks or by grade marks.

To buy lumber to the best advantage one should have a reliable general understanding of what American lumber standards include or exclude, even though it may not be practicable or possible to become informed on all the technical facts and details. Those interested in the detailed and technical features of the standards and the history of their development should secure from the Superintendent of Documents, Washington, D. C., the official publication of the standards entitled "Simplified Practice Recommendation R16–29, Fourth edition," issued by the United States Department of Commerce. For those who may benefit most from a descriptive outline and an explanation as free as possible from details and technical terms, the provisions of the standards are outlined in the following pages.

RÉSUMÉ OF PROVISIONS OF AMERICAN LUMBER STANDARDS

The standards deal separately with each of the three commercial types of softwood sawed products; namely, yard lumber, factory and shop lumber, and structural material. Recommended hardwood factory lumber standards have been prepared and published by the central committee on lumber standards, but they are omitted from the American lumber standards published by the Department of Commerce, because of the lack of necessary trade action for their ratification. In the description which follows of the more significant features of the standards, no attempt is made to deal with the particulars regarding the different types of lumber. The reader should have in mind the distinctions among these three types of lumber. Softwood yard lumber is that most commonly carried in retail yards for use in general building construction. Softwood factory and shop lumber is that intended for cutting-up purposes primarily in the manufacture of sash, doors, and similar millwork products. Structural material includes timbers and heavy dimension for structural purposes where working stresses are required and defects are limited according to their effect on the strength of the piece as a whole. The distinctions drawn as to what comprises softwood lumber are those generally used in the trade; that is, softwood lumber is that cut from needle-leaved evergreen trees, whereas hardwood lumber is that from broad-leaved deciduous trees, without regard to the actual hardness of the wood itself.

GRADE STANDARDS

Standards of quality for use in classifying pieces according to the character and location of defects, such as knots, pitch, shake, decay, and the like, comprise one of the important parts of American lumber standards. The principles to be followed in segregating the run of lumber into grades are laid down for each of the three types of lumber previously mentioned in what are termed "basic grade classifications," or grade examples. In yard lumber they are based principally on the effect of defects on appearance and general utility, in factory lumber on cutting-up value, and in structural material on factors affecting the strength. For each type of lumber the basic grades are expressed in terms which are general enough to cover all species and all items of lumber, regardless of inherent species differences and of requirements for specific uses. This means, of course, that grades of the same name in various species are not necessarily identical in quality and therefore are not necessarily equally adapted to specific uses. The basic provisions in regard to grade give the general features according to which the grading rules for different lumber items and species are written by the regional manufacturers' associations. They are not in the form of detailed grading rules, nor do they take such a place in any way. In the case of structural material definite limitations are given for the defects which influence strength. Commercial or association grades may be very different in their requirements from American lumber standards; yet they are not said to conform to the standards unless the defects are limited in such a way that they do not exceed in any respect the defects permitted in the corresponding provision of the American lumber standards.

Standard names are provided for each grade, excepting structural material—uniform for all species and all manufacturers' associations. For use in connection with grading rules for yard lumber and structural material, definitions of defects and blemishes and provisions as to how they shall be measured are included; for factory lumber various standard cuttings are defined as to quality and size. Requirements affecting the uniform application of the grading rules of each manufacturers' association are laid down specifically to deal with such points as allowances for material below grade, face from which inspection is made, equivalent defects, mixed grades, and the like.

SIZE STANDARDS

The thicknesses and widths, which have been agreed to by the trade as standard sizes corresponding to the nominal sizes used as a basis of board-foot measurement, are enumerated in detail for all the usual items of lumber. They are given both for dressed and for rough lumber and are of most general interest in the case of the 1-inch yard board and 2-inch dimension. The standard dressed sizes are uniformly applicable to all species of lumber, and apply in the condition of seasoning as sold and shipped by the producer. The condition of seasoning, which affects both thickness and width, varies with regional and individual mill practice. At present in the rules of one association maximum permissible moisture content is defined.

Standard lengths are also defined.

MEASUREMENT, DESCRIPTION, TALLYING, AND MARKING STANDARDS

The details for applying the principles of board-foot measurement are given for each of the different types of lumber and with reference to both standard and special sizes. Exact methods of describing and tallying for invoice purposes both standard and special sizes are also given. The use of tally cards in the interest of carload-lot buyers is provided for, and stipulations are made governing the grade marking of lumber when applied.

INSPECTION SERVICE AND MAINTENANCE OF STANDARDS

Rules governing the application of association inspection service are given at length, and provisions are set up as to the responsibility of the lumber industry for the maintenance and administration of the standards. They relate to changes in grade subsequent to shipment, application of association inspection to nonmembers and to nonstandard grades, certificates of inspection, and the filing and handling of complaints and applications for reinspection or retallying and the responsibility of the buyer in connection with such complaints.

NOMENCLATURE OF COMMERCIAL WOODS

The commercial names for lumber that are commonly used, particularly by the lumber manufacturers, are made the standard basis of contracts and are listed along with the botanical name of the tree from which the lumber is cut. With certain exceptions these standard names conform to the official nomenclature of the Forest Service.

SUMMARY AND CONCLUSIONS

American lumber standards are primarily a guide for the preparation of grading specifications by the various regional lumber manufacturers' associations. However, in providing approved terms for the description of lumber relative to its size, grade, nomenclature, and measurement, the standards react to the direct benefit and protection of the lumber-buying public. A greater uniformity in lumber has resulted from the progress made thus far in the formulation of national standards and in the securing of trade compliance with them. This applies particularly with respect to the dressed dimensions of the more commonly used items of lumber. The thickness of a given lot of lumber can be more easily and accurately appraised for conformance to the requirements of good trade practice than ever before.

Definite as have been the benefits to date, probably the greatest value of American lumber standards to the consuming public lies in the fact that the way is provided for concerted action in putting into effect improvements that are essential to the increased service and satisfaction that lumber can give. More definite limitations on the defects admitted in yard lumber need to be incorporated in the standards to promote greater uniformity in grading. A uniform condition of seasoning at which lumber sizes apply is fundamental to real standardization of size, and standards of lumber dryness in terms of moisture content are features of major importance that need development as time goes on.

American lumber standards now make it possible for the lumber-buying public to purchase its lumber requirements with increased confidence and assurance, and provide the way for still greater improvements.

APPENDIX A

LUMBER ASSOCIATIONS ISSUING GRADING RULES[3] FOR IMPORTANT COMMERCIAL SPECIES AND MAINTAINING INSPECTION DEPARTMENTS

Name	Address	Kind of wood covered[4]
California Redwood Association.	San Francisco, Calif	Redwood.
California White and Sugar Pine Manufacturers' Association.	do	Western yellow pine, sugar pine, white fir, incense cedar, Douglas fir.
National Hardwood Lumber Association.	Chicago, Ill	All hardwoods—oak, walnut, maple, gum, birch, basswood, elm, ash, chestnut, yellow poplar, and the like, and southern cypress and eastern red cedar.
North Carolina Pine Association.	Norfolk, Va	Southern yellow pine.
Northern Hemlock and Hardwood Manufacturers' Association.	Oshkosh, Wis	Eastern hemlock, tamarack.
Northern Pine Manufacturers' Association.	Minneapolis, Minn	Northern white pine, Norway pine, eastern spruce, tamarack.
Southern Cypress Manufacturers' Association.	Jacksonville, Fla	Southern cypress.
Southern Pine Association	New Orleans, La	Southern yellow pine.
West Coast Lumbermen's Association.	Seattle, Wash	Douglas fir, western hemlock, Sitka spruce, western red cedar.
Western Pine Manufacturers' Association.	Portland, Oreg	Western yellow pine, western white pine, western larch, Douglas fir, white fir, cedar, spruce.
White Pine Association of the Tonawandas.	North Tonawanda, N. Y.	Northern white pine.

---

[3] Copies may be obtained by applying to the association office.

[4] The nomenclature followed in this list is that of the Forest Service and differs in certain cases from that used in grading rules. By reference to p. 239, Miscellaneous Circular 92. Check List of the Forest Trees of the United States: Their Names and Ranges, lumber users can determine what other names are current in the trade.

The National Lumber Manufacturers' Association. Washington, D. C., is an organization of regional associations which administers no grading rules but maintains a central bureau for promoting uniformity and maintaining high standards of grading and inspection of softwood lumber under American lumber standards.

APPENDIX B

The following pages, although not pertaining exclusively to the actual provisions of American lumber standards, are appended with the idea that the illustrations, together with the accompanying descriptions, may aid in a clearer understanding of the most widely used grades provided by association grading rules under American lumber standards.

SELECT GRADE QUALITIES UNDER BASIC GRADE CLASSIFICATION FOR SOFTWOOD YARD LUMBER

Select grades provide for good appearance and finishing qualities, grades A and B are suitable for natural, and grades C and D for paint finishes. Grade A is omitted from illustration here because it is usually combined with grade B and sold as B and Better.

B Select and Better (pl. 1, A) is described in basic classification as allowing a few small defects. In practice these small defects take the form of minor imperfections in manufacture and seasoning and, depending on the species, small pitch defects, or pin knots, or the like. The A Select pieces in the mixed grade are practically clear, but the average board contains one to two small defects.

C Select (pl. 1, B) is classified as allowing a limited number of small defects that can be covered with paint. Specifically the number of defects per board averages about twice that of B and Better and the proportion of defects in C Select that are small knots is greater than in B and Better.

D Select (pl. 1, C) is classified as allowing any number of defects that do not detract from a finish appearance when painted. In practice the number of defects per board averages three to five times as many as in B and Better. Certain natural and manufacturing defects are not much more numerous in D Select than in C Select, but the number and size of the knots in D Select are considerably greater than in C Select, and usually the back is of somewhat lower quality. Commercial grading permits an occasional coarse defect in D Select that may be cut out with restrictions as to waste. D Select is in reality a one-face grade, that is, only one face shows in actual use.

TYPICAL DEFECTS OF DETERMINING IMPORTANCE IN SELECT GRADES

KNOTS IN SELECT GRADES

The knots occurring in (pl. 1, D) B and Better are predominantly under one-half inch in diameter and have smooth hard surfaces. A small proportion of the knots in C Select are as large as 1 inch in diameter, and a few are not of the best quality. A few knots in D Select are more than 1 inch in diameter and in quality are slightly soft, rough, or loose.

CHECK

Seasoning defects, such as check (pl. 1, E), either in flat surfaces or at the ends of boards, are among the more frequent defects in the select grades. Seasoning defects often cause a lowering of grade. The number of defects as the result of seasoning is considerably reduced at plants of careful manufacturers.

PITCH POCKET

Pitch pocket (pl. 1, F) is a relatively common defect in the select grades of several species but occurs less frequently than knots in all the important species except one. The variation among grades in the number and size of pitch pockets is not so marked as with knots. The frequency of pitch pockets as compared with other forms of pitch varies considerably among the species.

Among the other defects that are factors in the select grades are stain and chipped and torn grain and similar manufacturing defects.

COMMON GRADE QUALITIES UNDER BASIC GRADE CLASSIFICATION FOR SOFTWOOD YARD LUMBER

Common grades contain defects that detract from a finish appearance but are suitable for general utility and construction purposes. The differences between the various common grades are due to the character more than to the number of defects. The number of defects in a board averages in different species about 5 to 20 per 8 board feet regardless of grade. No. 1 and No. 2 Common are for use without waste. No. 3, No. 4, and No. 5 Common permit a limited amount of waste.

No. 1 Common (pl. 2, A) is described in the basic classification as sound and tight-knotted stock in which the size of the defects is limited. The provisions further state that it may be considered water-tight lumber. In most species practically all boards in the grade contain knots, although in some species pitch defects are the predominant defect in the grade. The size of the knots varies with the species. From one-half to three-fourths of the knots are usually intergrown; the remaining knots are incased, a small proportion of which are unsound, broken, or checked.

No. 2 Common (pl. 2, B) is classified as allowing large and coarse defects that may be considered grain tight. In practice a limited amount of through shake, through pitch pockets, and decay is permitted in the grade. The proportion of large knots is greater than in No. 1 Common, and whereas one-third to two-thirds of the knots are intergrown 10 per cent or more are usually unsound, loose, or otherwise partially open. Some commercial rules allow knot holes provided they are strictly limited as to size and number.

No. 3 Common (pl. 2, C) is classified as allowing larger and coarser defects than No. 2 Common and also occasional knot holes. A larger proportion of large knots and increased amounts of shake, split, decay, and holes distinguish No. 3 Common from No. 2 Common.

Grades No. 4 and No. 5 Common are provided for in the standards but are omitted from illustrations here because they are not produced in some species, and in most other species they are of local importance only. They are low-quality lumber admitting the coarsest defects.

TYPICAL DEFECTS OF DETERMINING IMPORTANCE IN COMMON GRADES

INTERGROWN KNOT

In most species one-third to two-thirds of the knots in the common grades are intergrown (pl. 2, D), whereas in the select grades they comprise a small proportion of the total. Intergrown knots may check if large, but they do not loosen or drop out, as they are integral parts of the wood.

INCASED KNOT

In some species a large number of the incased knots (pl. 2, E) remain tight, but in other species many of them loosen. The loosening becomes more pronounced in large knots and as the lumber becomes drier. As a rule incased knots comprise a larger percentage of the total number of knots in the small-knotted select grades than in the larger-knotted common grades.

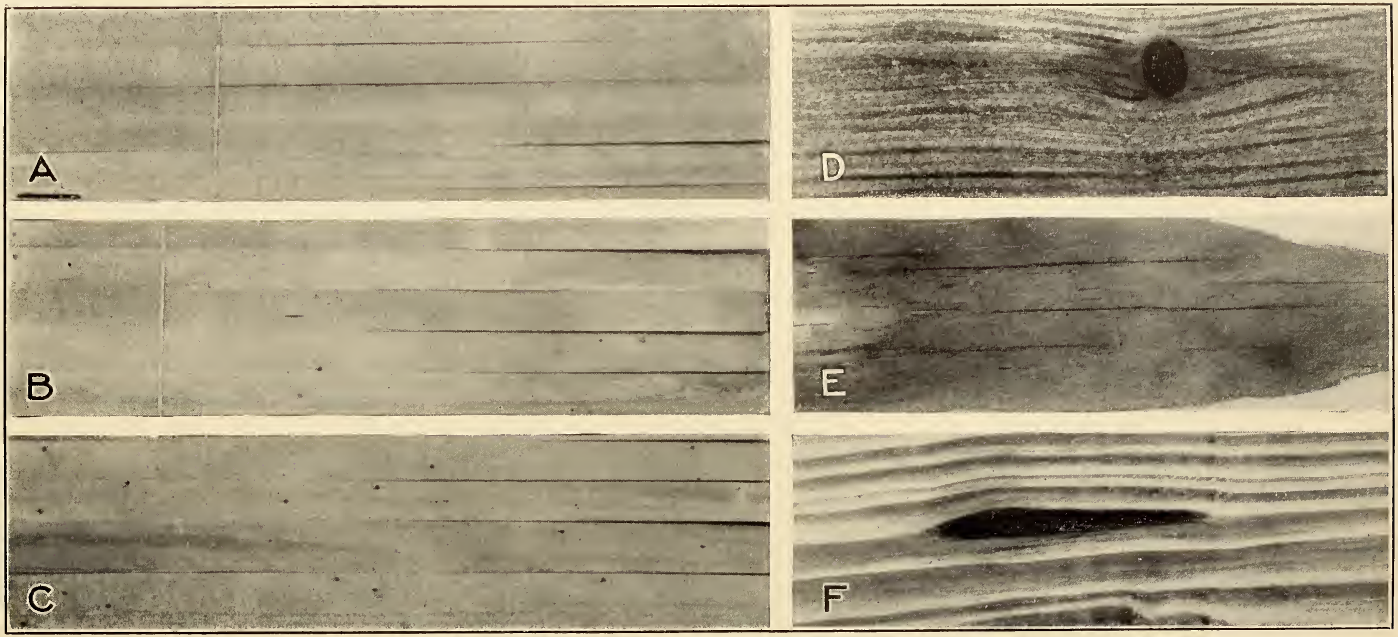
SPIKE KNOT

Spike knots (pl. 2, F) are formed by cutting a branch lengthwise rather than crosswise as is the case with round knots. Spike knots occur infrequently in grades better than No. 2 Common.

DECAY

Wood that contains small areas of clearly evident decay (pl. 2, G) is not permitted in grades better than No. 2 Common.

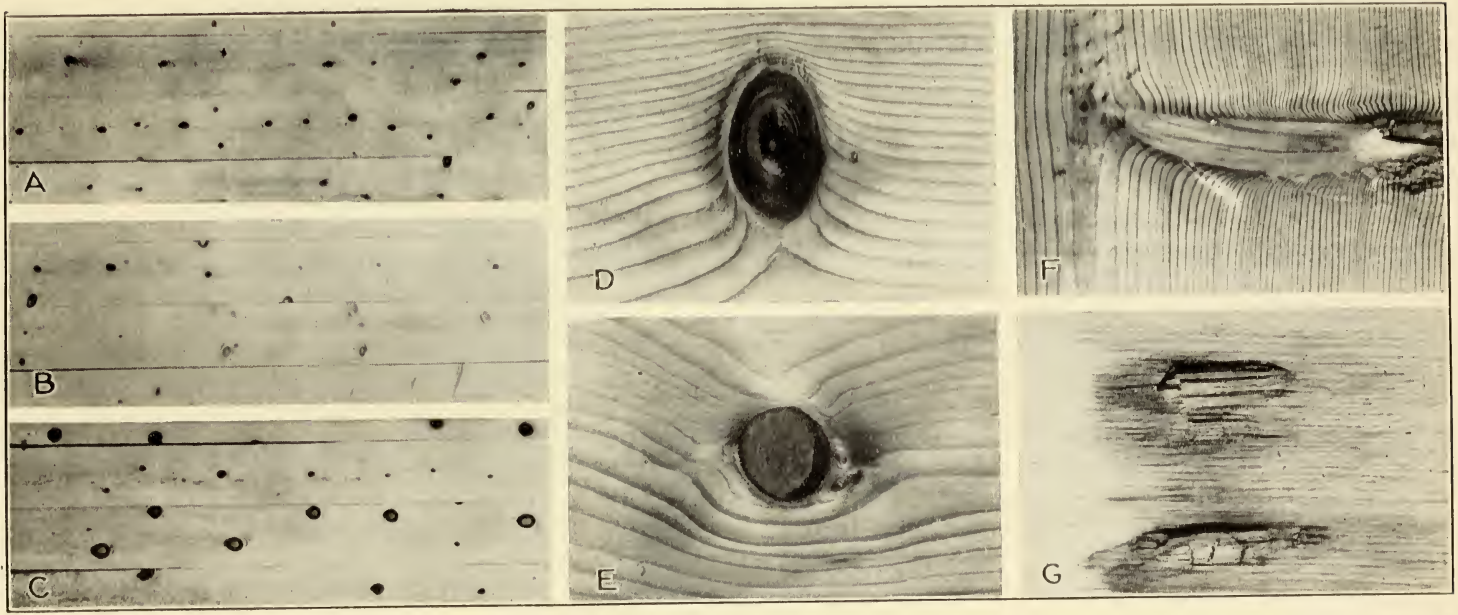
The defects found in the select grades are also found in the common grades usually to a large degree. Split, shake, worm holes, and wane are also among the defects more frequently encountered in common grades.



M15119F

A—B and Better Select
B—C Select
C—D Select

D—Knot in Select grades
E—Check
F—Pitch pocket



M15118F

A—No. 1 Common
B—No. 2 Common
C—No. 3 Common

D—Intergrown knot
E—Incased knot

F—Spike knot
G—Decay

ORGANIZATION OF THE UNITED STATES DEPARTMENT OF AGRICULTURE WHEN THIS PUBLICATION WAS LAST PRINTED

Secretary of Agriculture	ARTHUR M. HYDE.
Assistant Secretary	R. W. DUNLAP.
Director of Scientific Work	A. F. WOODS.
Director of Regulatory Work	WALTER G. CAMPBELL.
Director of Extension Work	C. W. WARBURTON.
Director of Personnel and Business Administration.	W. W. STOCKBERGER.
Director of Information	M. S. EISENHOWER.
Solicitor	E. L. MARSHALL.
Weather Bureau	CHARLES F. MARVIN, *Chief.*
Bureau of Animal Industry	JOHN R. MOHLER, *Chief.*
Bureau of Dairy Industry	O. E. REED, *Chief.*
Bureau of Plant Industry	WILLIAM A. TAYLOR, *Chief.*
Forest Service	R. Y. STUART, *Chief.*
Bureau of Chemistry and Soils	H. G. KNIGHT, *Chief.*
Bureau of Entomology	C. L. MARLATT, *Chief.*
Bureau of Biological Survey	PAUL G. REDINGTON, *Chief.*
Bureau of Public Roads	THOMAS H. MACDONALD, *Chief.*
Bureau of Agricultural Economics	NILS A. OLSEN, *Chief.*
Bureau of Home Economics	LOUISE STANLEY, *Chief.*
Plant Quarantine and Control Administration	LEE A. STRONG, *Chief.*
Grain Futures Administration	J. W. T. DUVEL, *Chief.*
Food and Drug Administration	WALTER G. CAMPBELL, *Director of Regulatory Work, in Charge.*
Office of Experiment Stations	————, *Chief.*
Office of Cooperative Extension Work	C. B. SMITH, *Chief.*
Library	CLARIBEL R. BARNETT, *Librarian.*

This publication is a contribution from

Forest Service	R. Y. STUART, *Chief*
Branch of Research	EARLE H. CLAPP, *Assistant Forester, in Charge.*
Forest Products Laboratory	CARLILE P. WINSLOW, *Director.*

U. S. GOVERNMENT PRINTING OFFICE: 1931

For sale by the Superintendent of Documents, Washington, D. C. - - - - - Price 5 cents